## **CLAIMS**

## What is claimed is:

1. A method for modifying the characteristics of an acoustic wave, comprising the steps of:

providing a medium for acoustic wave propagation;

generating an acoustic wave;

propagating the acoustic wave using the medium; and

illuminating the medium during the propagation of the acoustic wave.

- 2. The method of Claim 1, wherein the medium is a piezoelectric substrate.
- 3. The method of Claim 2, wherein a transducer is formed on the piezoelectric substrate.
- 4. The method of Claim 3, wherein the acoustic wave is generated by the transducer.
- 5. The method of Claim 1, wherein the medium is illuminated using a laser diode.
- 6. The method of Claim 1, wherein the medium is illuminated using a light-emitting diode.
- 7. The method of Claim 6, further comprising the step of varying an intensity of a light generated by the light-emitting diode.
- 8. The method of Claim 7, wherein the intensity of the light is varied by a controller.
- 9. The method of Claim 7, wherein the intensity of the light is varied by a light modulator.
- 10. The method of Claim 1, further comprising the step of reading a selected frequency component of the acoustic wave.
- 11. A method for modifying the characteristics of an acoustic wave, comprising the steps

generating an acoustic wave in a medium; and varying a velocity of the acoustic wave.

- 12. The method of Claim 11, wherein the medium is a piezoelectric substrate.
- 13. The method of Claim 11, wherein the velocity of the acoustic wave is varied by illuminating the medium.

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- 14. The method of Claim 12, wherein a transducer is formed on the piezoelectric substrate.
- 15. The method of Claim 14, wherein the acoustic wave is generated by the transducer.
- 16. The method of Claim 11, further comprising the step of reading a selected frequency component of the acoustic wave.
- (17.) An apparatus for varying the characteristics of an acoustic wave, comprising:
  - a medium for acoustic wave propagation;
  - a transducer formed on the medium; and
  - a light source illuminating the medium.
- 18. The apparatus of Claim 17, wherein the medium is a piezoelectric substrate.
- 19. The apparatus of Claim 17, wherein the transducer generates an acoustic wave.
- 20. The apparatus of Claim 17, wherein the light source is a laser diode.
- 21. The apparatus of Claim 17 wherein the light source is a light-emitting diode.
- 22. The apparatus of Claim 21, wherein an intensity of a light generated by the light-emitting diode is varied.
- 23. The apparatus of Claim 22, wherein the intensity of the light is varied by a controller.
- 24. The apparatus of Claim 17, wherein a selected frequency component of the acoustic wave is read from the transducer.
- 25. The apparatus of Claim 22, wherein the intensity of the light is varied by a light modulator.
- 26. A method for making an acoustic wave device, comprising the steps of:

providing a medium for acoustic wave propagation;

forming a transducer on the medium; and

providing a light source for illuminating the medium.

- 27. The method of Claim 26, wherein the medium is a piezoelectric substrate.
- 28. The method of Claim 26, wherein the light source is a laser diode.
- 29. The method of Claim 26, wherein the light source is a light-emitting diode.
- 30. The method of Claim 26, further comprising the step of providing means for varying an intensity of a light generated by the light-emitting diode.
- 31. The method of Claim 30, wherein the means for varying the intensity of the light comprises a controller.

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- 32. The method of Claim 30, wherein the means for varying the intensity of the light comprises a light modulator.
- An apparatus for varying the characteristics of an acoustic wave, comprising:

  a medium for acoustic wave propagation; and
  a transducer formed on the medium,
  wherein a light source is used to illuminate the medium.
- 34. The apparatus of Claim 33, wherein the medium is a piezoelectric substrate.
- 35. The apparatus of Claim 33, wherein the transducer generates an acoustic wave.
- 36. The apparatus of Claim 33, wherein the light source is a laser diode.
- 37. The apparatus of Claim 33 wherein the light source is a light-emitting diode.
- 38. The apparatus of Claim 37, wherein an intensity of a light generated by the light-emitting diode is varied.
- 39. The apparatus of Claim 38, wherein the intensity of the light is varied by a controller.
- 40. The apparatus of Claim 33, wherein a selected frequency component of the acoustic wave is read from the transducer.
- 41. The apparatus of Claim 38, wherein the intensity of the light is varied by a light modulator.
- A method for modifying the characteristics of an acoustic wave, comprising the steps

of:

providing a medium for acoustic wave propagation;

generating an acoustic wave;

propagating the acoustic wave using the medium; and

inducing a charge grating in the medium during the propagation of the acoustic

wave.

- 43. The method of Claim 42, wherein the medium is a piezoelectric substrate.
- 44. The method of Claim 43, wherein a transducer is formed on the piezoelectric substrate.
- 45. A method for making an acoustic wave device, comprising the steps of:

providing a medium for acoustic wave propagation;

forming a transducer on the medium; and

providing a light source for inducing a charge grating in the medium.

- 46. The method of Claim 45, wherein the medium is a piezoelectric substrate.
- 47. The method of Claim 45, wherein the light source is a laser diode.
- 48. The method of Claim 45, wherein the light source is a light-emitting diode.
- 49. The method of Claim 45, further comprising the step of providing means for varying an intensity of a light generated by the light-emitting diode.
- 50. The method of Claim 49, wherein the means for varying the intensity of the light comprises a controller.
- 51. The method of Claim 49, wherein the means for varying the intensity of the light comprises a light modulator.

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